544

ABSTRACTS
OF PAPERS

C.F.T.R.I. REGIONAL CENTRE
565
DIARY NO.
DATE 20/8/97
LUDHIANA

International Conference
on
TRADITIONAL FOODS

March 6, 7 & 8, 1997

at

Central Food Technological Research Institute
Mysore, India

Jointly Organised by :

UNITED NATIONS UNIVERSITY
Tokyo, Japan

MFPI

MINISTRY OF FOOD PROCESSING INDUSTRIES
Government of India, New Delhi, India

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE
Mysore, India
(A constituent Laboratory of
Council of Scientific and Industrial Research, New Delhi and
Affiliate Centre of United Nations University)

cftri

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Printed by offset at CFTRI press Mysore

Programme

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Thursday the 6th March 1997

8.00 AM	**Assembly and Registration at IFTTC Auditorium , CFTRI**
SESSION I:	**INAUGURATION** *Venue: IFTTC Auditorium*
9.00 AM	**Invocation** *Students Group, CFTRI, Mysore*
9.05 AM	**Welcome** *J. V. Prabhakar* *Head, Lipid Science and Traditional Foods Dept.* *CFTRI, Mysore*
9.10 AM	**Opening Remarks** *H.A.B. Parpia* *Chairman, Traditional Foods Panel, MFPI*
9.20 AM	**Theme of the Conference** **and** **Inaugural Address** *Abraham Besrat, Principal Academic Officer* *United Nations University, Tokyo, Japan*
9.35 AM	**Presidential Address** *V. Prakash,* *Director, CFTRI, Mysore &* *Chairman, National Steering Committee on* *Traditional Foods Workshops, MFPI*
10.00 AM	**Vote of Thanks** *B.K. Lonsane* *Convener, International Conference on* *Traditional Foods, CFTRI, Mysore*
10.15 AM	**Tea** *Venue: At the lawns of IFTTC*

Thursday the 6th March 1997

SESSION II: **TRADITIONAL FOODS: RETROSPECT- PROSPECTS**

Venue: Assembly Hall
Main Mansion, CFTRI

Chairperson	: Promilla Issar
Co-Chairperson	: J. V. Prabhakar
Rapporteurs	: L. Parthasarathy
	: Parvin Banu Cadi

11.00 AM	**Contribution of Traditional Food Technologies to Food Security in Africa** *Montairou Egounlety, Abomey-Calavi, Benin*
11.15 AM	**Traditional Food Processing Systems: Opportunities for Food Science and Technology Intervention** *S.Sefa-Dedeh, Legon, Ghana*
11.30 AM	**Traditional Foods** *Abeba Gobezie, Addis Ababa, Ethiopia*
11.45 AM	**(Title awaited)** *Parvin Banu Cadi, Dhaka, Bangladesh*
12.00 Noon	**(Title awaited)** *Jasper K. Imungi, Kabete, Kenya*
12. 15 PM to 12.45 PM	**DISCUSSION**

1.00 PM **Lunch**
Venue: IFTTC Auditorium

Thursday the 6th March 199?

SESSION II: **TRADITIONAL FOODS: RETROSPECT - PROSPECTS**

Continued . . .

Venue: Assembly Hall
Main Mansion

Chairperson	: B.L. Amla
Co-Chairperson	: N.G. Karanth
Rapporteurs	: B.R. Sri Hari
	: M.S. Narayan

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Purwo Arbianto, Bandung, Indonesia

2.15 PM **(Title awaited)**
J.P. Tamang , Gangtok, India

2.30 PM **Current Status of Korean Traditional Food Processing Technology**
K.S. Chang , Taejon City, Korea

2.45 PM **(Title awaited)**
Paulina Zharare, Harare, Zimbabwe

3.00 PM **Traditional Foods and Nutritional Security**
Slamet Sudarmadji, Yogyakarta, Indonesia

3.15 PM to 3.30 PM **DISCUSSION**

3.30 PM **Tea**

Thursday the 6th March 1997

SESSION III : **OUTPUTS OF REGIONAL WORKSHOPS ON TRADITIONAL FOODS**

Venue : Assembly Hall
Main Mansion

Chairperson : H.A.B. Parpia
Co-Chairperson : R. Joseph
Rapporteurs : L. Parathasarathy
: Paulina Zharare

3.45 PM **Eastern Region**

Indira Chakravarty
All India Institute of Hygiene & Public Health, Calcutta

4.00 PM **Western Region**

P.J. Dubash
University Department of Chemical Technology, Mumbai

4.15 PM **Southern Region**

Vijayalakshmi Purushothaman
Avinashilingam Deemed University, Coimbatore

4.30 PM **Northern Region**

S.K. Berry
CFTRI Regional Centre, Ludhiana

4.45 PM **Central Region**

D.G. Rao
CFTRI Regional Centre, Hyderabad

5.00 PM to 5.30 PM **DISCUSSION**

5.30 PM **High Tea**

7.00 PM **Cultural Programme**

Venue : IFTTC Auditorium
Ballet : **Shakuntala**
Vasundhara Performing Arts Centre Trust (R), Mysore

8.30 PM **Dinner**
Venue: Lawns , Opposite IFTTC Auditorium

Friday the 7th March 1997

SESSION IV : **COUNTRY PAPERS**

Venue: Assembly Hall
Main Mansion

Chairperson : Abraham Besrat
Co-Chairperson : A. Ramesh
Rapporteurs : G. Vijayalakshmi
: Laila Hussein

8.30 AM **Traditional Foods of Republic of Benin**
Montairou Egounlety, Abomey - Calavi, Benin

8.45 AM **Traditional Food Products of Ghana**
S. Sefa-Dedeh, E. Sakyi-Dawson and A.S. Budu
Lagon, Ghana

9.00 AM **Traditional Foods of Ethiopia**
Abeba Gobezie and Lakech Goitom
Addis Ababa, Ethiopia

9.15 AM **Traditional Foods of Bangladesh**
Parvin Banu Cadi, Dhaka, Bangladesh

9.30 AM **Traditional Foods of Kenya**
Jasper K. Imungi, Kabete, Kenya

9.45 AM **Traditional Fermented Foods and Beverages of the Sikkim Himalaya: Process and Product Characterization**
J.P. Tamang, Gangtok, India

10.00 AM to 10.15 AM DISCUSSION

10.20 AM Tea

Friday the 7th March 1997

SESSION IV : Continued . . .

COUNTRY PAPERS

Venue: Assembly Hall, Main Mansion

Chairperson : Slamet Sudarmadji
Co-Chairperson : B.K. Lonsane
Rapporteurs : M.C. Misra
: H.V. Narasimha

10.35 AM	**Sorghum - based Traditional Foods of Sudan : Preparation and Quality Aspects** *E.A. Elkhalifa, Medani, Sudan*
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11.35 AM	**Korean Traditional Food - *Kimchi*** *K.S. Chang , Taejon City, Korea*
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12.20 PM	**Traditional Foods : Indian Scenario** *J.V. Prabhakar, Mysore, India*
12.35 PM	**(Title awaited)** *Paulina Zharare, Harare, Zimbabwe*
12.50 PM to 1.15 PM	**DISCUSSION**
1.30 PM	**Lunch** *Venue: IFTTC Auditorium*
2.15 PM	**Visit to CFTRI** *(Show-Case, Pilot Plant and SRP Block)*
3.35 PM	**Tea** *Venue: Near Assembly Hall*

Friday the 7th March 1997

SESSION V: **CASE STUDIES**

Venue: Assembly Hall , Main Mansion

Chairperson : M.M. Krishnaiah
Co-Chairperson : D. Rajalakshmi
Rapporteurs : K.K. Sakariah
: Abeba Gobezie

4.00 PM **Production and Commercialization of *Woaguchi*, a Beninese Soft Cheese**
Montairou Egounlety, Abomey - Calavi, Benin

4.10 PM **Upgrading Traditional Food Processes and Products: The Case Study of Fermented Cereal Products**
S. Sefa-Dedeh, F.K. Saaliah and E. sakyi - Dawson Legon, Ghana

4.20 PM **How a traditional Ethiopian food, *Ensete*, made it into the city**
Abeba Gobezie and Frew Tekabe, Addis Ababa, Ethiopia

4.30 PM **Utilization of Whey Protein Concentrates as Emulsifier and Stabilizer**
G. Muschiolik, S. Gunsel, H.M. Rawel and I. Scherze, Bergholz-Rehbrucke, Germany

4.40 PM **Commercialization of Traditional Foods in Kenya: A Case Study of Fermented Milk**
Jasper K. Imungi, Kabete, Kenya

4.50 PM **Use of Lactic Acid Bacteria Simultaneously Producing Amylase, Linamarase and Lysine for the Amelioration of *Garri*, a Fermented Food Produced from Cassava/ *Manihot esculenta* Crantz**
Nduka Okafor, Enugu, Nigeria

5.00 PM **Traditional Foods of Bangladesh: Case Study**
Parvin Banu Cadi, Dhaka, Bangladesh

5.10 PM **Indonesian Traditional Foods - A Case Study**
Purwo Arbianto, Bandung, Indonesia

5.20 PM **(Title awaited)**
Paulina Zharare, Harare, Zimbabwe

5.30 PM **(Title awaited)**
J.P. Tamang , Gangtok, India

5.40 PM to 6.00 PM **DISCUSSION**

Saturday the 8th March 1997

SESSION V: Continued . . .

CASE STUDIES

Venue: Assembly Hall , Main Mansion

Chairperson : V. Prakash
Co-Chairperson : K.S. Chang
Rapporteurs : G. Ramanatham
: Purwo Arbianto

8.30 AM	**Commercialization of *Geplak:* Case Study of a Traditional Food** *Slamet Sudarmadji, Yogyakarta, Indonesia*
8.40 AM	**Changes in Textural Properties of *Jeung-Pyon* (Korean Traditional Fermented Rice Bread) During Storage** *K.S. Chang, Taejon City, Korea*
8.50 AM	**Research and Development of Soysauce Industry in Japan** *Tamotsu Yokotsuka, Chiba - ken, Japan*
9.00 AM	**(Title awaited)** *G.G. Kahng, Chinju City, R.O.Korea*
9.10 AM	**A Case Study on Process Development for Manufacturing Vinegar, a Traditional Fermented Seasoning in Korea** *Peong-Ug Ahn, Seoul, Korea*
9.20 AM	**(Title awaited)** *M.P. Vaidehi, Bangalore, India*
9.30 AM	**Traditional Foods by Microbial Processes** *M.C. Varadaraj and R. Joseph, Mysore, India*
9.40 AM	**Malted Weaning Food - A Case Study** *N.G. Malleshi, Mysore, India*
9.50 AM	**Traditional Oilseed Based Foods** *M.C. Shamanthaka Sastry, Mysore, India*
10.00 AM	**Product Positioning of *Bhujia* - A Case Study** *D. Rajalakshmi and Nagin Chand, Mysore, India*
10.10 AM	**Packaging of Indian Traditional Foods - A Case Study** *K.R. Kumar, Mysore, India*
10.20 AM	**Functionality of an Acidic Mucilagenous Polysaccharide from Blackgram in Traditional Food - *Idli*** *R.N. Tharanathan, Mysore, India*

10.30 AM Tea

Saturday the 8th March 1997

SESSION V:
Continued . . .

CASE STUDIES

Venue: Assembly Hall , Main Mansion

10.45 AM **Production of *Kachampulli*, a Traditional Product from Malabar Tamarind (*Garcinia cambogia*)**
M.C. Misra and S.P. Manjrekar, Mysore, India

10.55 AM **Raw Mango Powder (*Amchur*) - A Case Study**
W.E. Eipeson , S.P. Kulkarni, M.R. Vijayalakshmi and R.S. Ramteke, Mysore, India

11.05 AM **Processes and Machinery for Traditional Foods**
Suvendu Bhattacharya and A. Ramesh, Mysore, India

11.15 AM **Developments in Wheat-based Indian Traditional Foods**
P. Haridas Rao, Mysore, India

11.25 AM ***Tandoori* Chicken - Indian Traditional Food**
K.K.S. Nair, P. Puttarajappa and D. Narasimha Rao Mysore, India

11.35 AM **Production of Fresh Ginger Candy**
S.R. Sampathu, N. Krishnamurthy, H.B. Sowbhagya Mysore, India

11.45 AM **Indian Traditional Sweetmeats - A Case Study**
Yella Reddy, S. Jayarani and J.V. Prabhakar Mysore, India.

11.55 AM **Insect Pest and Infestation Management in Traditional Foods Manufacture and Storage - A Case Study**
S. Rajendran and K.S. Narasimhan, Mysore, India

12.05 PM **Human Resource Development at CFTRI in the Context of Traditional Foods**
S. Godavari Bai, Mysore, India.

12.15 PM **Microbiological Quality of Traditional Sweetmeats of India**
J.S. Sandhu and M.N. Krishnamurthy, Mysore, India

12.25 PM **Commercialization of Traditional Foods - The Indian Experience with Special Reference to Dairy Foods**
Vijay Sood, New Delhi, India

12.35 PM **Commercialization of Indian Traditional Foods : *Jeelebi, Laddu, Bakervadi***
S.R. Chitale, Pune, India

12.45 PM to 1.20 PM **DISCUSSION**

1.30 PM **Lunch**
Venue: IFTTC Auditorium

Saturday the 8th March 1997

SESSION VI:

2. 00 PM
to
3.00 PM

INDUSTRY INTERACTIONS

Venue: Assembly Hall
Main Mansion

Chairperson : B.N. Som
Co-Chairperson : S.P. Pillai
Rapporteur : T.R. Prabhu

- ***Industry Representatives***
- ***Delegates from Academia***
- ***Representatives from MFPI & UNU***

3.00 PM **Tea**

Saturday the 8th March 1997

SESSION VII: **PLENARY SESSION**

Venue: Assembly Hall
Main Mansion

Chairperson : Promilla Issar
Joint Secretary
Ministry of Food Processing Industries,
New Delhi

3.15 PM to 5.00 PM — ***Panel Discussion and Recommendations on the Deliberations of the Earlier Sessions by Respective Chairpersons and Open House Discussion***

5.00 PM — **Closing Remarks**

Abraham Besrat

UNU, Tokyo

5.30 PM — **High Tea**

Curtains - down

Session I
March 6, 1997

INAUGURATION

Thursday the 6th March 1997

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10.15 AM	**Tea** *Venue: At the lawns of IFTTC*

Session II
March 6, 1997

TRADITIONAL FOODS: RETROSPECT - PROSPECTS

(Includes abstracts received upto 1.3.1997)

Thursday the 6th March 1997

SESSION II: **TRADITIONAL FOODS: RETROSPECT- PROSPECTS**

Venue: Assembly Hall
Main Mansion, CFTRI

Chairperson	: Promilla Issar
Co-Chairperson	: J. V. Prabhakar
Rapporteurs	: L. Parthasarathy
	: Parvin Banu Cadi

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Parvin Banu Cadi, Dhaka, Bangladesh

12.00 Noon **(Title awaited)**

Jasper K. Imungi, Kabete, Kenya

12. 15 PM to 12.45 PM **DISCUSSION**

1.00 PM **Lunch**
Venue: IFTTC Auditorium

Thursday the 6th March 1997

SESSION II: **TRADITIONAL FOODS: RETROSPECT - PROSPECTS**

Continued . . .

Venue: Assembly Hall
Main Mansion

Chairperson	: B.L. Amla
Co-Chairperson	: N.G. Karanth
Rapporteurs	: B.R. Sri Hari
	: M.S. Narayan

2.00 PM **Alternatives to the Development of Modern Industries Based on Traditional Food Processes**
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3.00 PM **Traditional Foods and Nutritional Security**
Slamet Sudarmadji, Yogyakarta, Indonesia

3.15 PM to 3.30 PM **DISCUSSION**

3.30 PM **Tea**

CONTRIBUTION OF TRADITIONAL FOOD TECHNOLOGIES TO FOOD SECURITY IN AFRICA

MOUNTAIROU EGOUNLETY

Departement de Nutrition & Sciences Alimentaires
Faculte des Sciences Agronomiques
Universite Nationale du Benin
Abomey-Calavi, Benin

To cope with the alraming food crisis in Africa and the failure of classical policies of technology transfer from North to South, the traditional food sector is organizing itself in order to feed a rapidly increasing African population. Innovations in equipment, process, product and even in social organization of food production have been recorded in this sector as a response of new life styles developed mainly in urban areas. The traditional food sector provides employment to the population and revenue to the industrial participants.

Without these traditional technologies, the post harvest losses would be very high. Therefore, more attention should be paid to the traditional foods. Efforts to be undertaken include a better knowledge of the traditional food technologies in order to upgrade them, an exchange of the knowledge packages among African countries and the industrialization of the sector, starting from small-scale and progressing to large-scale plants with due consideration to socio-cultural aspects.

TRADITIONAL FOOD PROCESSING SYSTEMS: OPPORTUNITIES FOR FOOD SCIENCE AND TECHNOLOGY INTERVENTION

S. SEFA-DEDEH

Department of Nutrition and Food Science
University of Ghana, Legon, Ghana

The bulk of raw food materials consumed in many African countries are converted into edible forms using traditional technologies. These food processing technologies apply techniques which are manageable, usually at scales within the economic control of indigenous people, have local demand and use local agricultural raw materials. They serve as a means of stimulating national agricultural growth, improve nutrition and provide employment. Unit operations in traditional food processing have the same scientific basis as techniques applied in modern food industry. There are opportunities for food scientists, technologists, engineers and other scientists to improve this very vital sector of the food system. The paper discusses the characteristics of traditional food processing systems in Ghana and the opportunities for the application of science and technology to improve product quality, safety and food as well as nutrition security.

TRADITIONAL FOODS

ABEBA GOBEZIE

Ethiopian Health and Nutrition Research Institute
Addis Ababa, Ethiopia

The paper demonstrates how people are influenced by tradition in the way they live in general, but also especially in the way they eat.

Food tradition does not die-out when everything else changes. Factors such as environment, economic situation, religion and availability of food influence the way people eat.

Some people adapt to new way of life quicker than others. Factors that affect one's flexibility in life, eating and behavior are influenced by how much strong the tradition is.

Examples of how people behave in different situations of life is cited in the text. The whole paper is drawn from different experiences of the author's life.

ALTERNATIVES IN THE DEVELOPMENT OF MODERN INDUSTRIES BASED ON TRADITIONAL FOOD PROCESSES

PURWO ARBIANTO

Chemistry Department Bandung Institute of Technology
Bandung, Indonesia

It is proposed to preserve the traditional fermentation processes within the context of rural development. The products of these industries might be used as basic materials for further processing. This arrangement might link the rural economy with the urban economy. It might also provide rural job opportunities to counter the urbanization process which is taking place at a fast pace.

CURRENT STATUS ON KOREAN TRADITIONAL FOOD PROCESSING TECHNOLOGY

KYU SEOB CHANG

Department of Food Technology
College of Agriculture
Chungnam National University, Taejon City 305 764, Korea

Traditional Foods of different nations have long histories. They are the foods made of local materials produced in that region and have their unique flavor and characteristics. They should be enjoyed by many people. Korea has number of traditional foods because of her long history of fifty centuries.

Korean traditional foods were mainly made from cereals, vegetables and marine products. On the history view point they have been created and disappeared with passing time depending on the consumer acceptance and always changed. A nations traditional foods are influenced by their environment circumstance, therefore it must be dependent on the raw material which is available in that country.

Korean traditional foods were not considered for storage and mass production because of limitation of only family consumption. For industrialization of traditional foods their taste and characteristic must be maintained, and partially it must be improved to suit the taste of modern people.

TRADITIONAL FOODS AND NUTRITIONAL SECURITY

SLAMET SUDARMADJI

Gadjah Mada University,
Yogyakarta, Indonesia

Traditional Foods can provide both food and nutritional securities to the common people. Because of their inherent character, traditional foods are readily available, because they are based on local ingredients for the continuity of supplies, involve simple technology adaptable to local conditions, low cost even at small scale production and widest distribution possible. They provide natural nutrients or improved nutritional value, highly acceptable formsand provide a variety of tastes, provide income to the people, serve as an alternative for storage and finally provide spiritual benefit to the people. The study for better understanding of traditional foods as a source of nutritional security needs to be done in line with the overall economic development of the community.

Session III
March 6, 1997

OUTPUTS OF REGIONAL WORKSHOPS ON TRADITIONAL FOODS

Thursday the 6th March 1997

SESSION III : **OUTPUTS OF REGIONAL WORKSHOPS ON TRADITIONAL FOODS**

Venue : Assembly Hall
Main Mansion

Chairperson : H.A.B. Parpia
Co-Chairperson : R. Joseph
Rapporteurs : L. Parathasarathy
: Paulina Zharare

3.45 PM **Eastern Region**

Indira Chakravarty
All India Institute of Hygiene & Public Health, Calcutta

4.00 PM **Western Region**

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S.K. Berry
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D.G. Rao
CFTRI Regional Centre, Hyderabad

5.00 PM to 5.30 PM **DISCUSSION**

5.30 PM **High Tea**

7.00 PM **Cultural Programme**

Venue : IFTTC Auditorium
Ballet : **Shakuntala**
Vasundhara Performing Arts Centre Trust (R), Mysore

8.30 PM **Dinner**
Venue: Lawns , Opposite IFTTC Auditorium

Session IV
March 7, 1997

COUNTRY PAPERS

(Includes abstracts received upto 1.3.1997)

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Friday the 7th March 1997

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10.20 AM **Tea**

Friday the 7th March 1997

SESSION IV : Continued . . .

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12.50 PM to 1.15 PM	**DISCUSSION**

1.30 PM **Lunch**
Venue: IFTTC Auditorium

2.15 PM **Visit to CFTRI**
(Show-Case, Pilot Plant and SRP Block)

3.35 PM **Tea**
Venue: Near Assembly Hall

TRADITIONAL FOODS FROM REPUBLIC OF BENIN

MOUNTAIROU EGOUNLETY

Departement de Nutrition & Sciences Alimentaires
Faculte des Sciences Agronomiques
Universite Nationale du Benin
Abomey-Calavi, Benin

In African towns, along the roads, near offices and industrial plants as well as in villages and everywhere in the countries, the staple food sellers, snack food sellers, food producers, restaurant owners and staple food processors are the evidence of the omnipresence, the wealth, the vitality and the importance of the traditional food sector. Almost all food crops are processed through traditional technologies and techniques designed by local people according to their needs. The traditional food sector is a reservoir of indigenous know-how transferred from generation to generation.

In Benin Republic, about one hundred different foods are being prepared from forty food crops. Cereal-based foods are predominant with more than fifty products, followed by root-and tuber-based foods and grain legume-based foods with twenty six and twenty products, respectively.

Two of these foods, namely *mawe* (fermented maize dough) and *gari* (fermented cassava food), are being given scientific and technological attention. A pilot plant was established at the University Campus for the production of *aklui* (dehydrated granulated *mawe*) and *yeke-yeke*(maize *couscous*). The Beninese processing technologies of some foods were transferred to West African people. Processors from Burkina-Faso, Senegal and Niger were educated in maize, cassava fruit and vegetable processing techniques of Beninese origin, while Beninese food processors learned fruit and vegetable processing technologies of Senegalese origin.

TRADITIONAL FOOD PRODUCTS OF GHANA

S. SEFA-DEDEH, E. SAKYI-DAWSON and A.S. BUDU

Department of Nutrition and Food Science
University of Ghana, Legon, Ghana

The application of traditional food processing technologies is critical to the attainment of food and nutrition security in households in sub-Saharan Africa. Through the application of these technologies a wide range of traditional foods are produced in most West African countries including Ghana. All the major food commodities produced in the sub region are processed into finished and intermediate products using traditional technology.

Cereal-based traditional foods are predominant and include products which have been subjected to various unit operations including steaming, baking, fermentation, roasting, frying, boiling and cooking. Some of these foods are packaged using plant materials, which provide protection against contamination and may impart flavour and colour to the products. Some of these cereal products are different types of kenkey (*ga kenkey* or *komi*, *fante kenkey, osino dokono, nsihu*, etc), *aboloo* (steamed or baked), *hausa koko, agidi, fomfom, nmeda, aliha, solom* and *akadamu.*

Traditional food products derived from roots and tubers include *gari, agbelima, akyeke, eputu, agbeli kakro* and *wasawasa*. Products derived from legumes, oilseeds, dairy and animal sources are consumed.

This paper provides an overview of traditional food products of Ghana and discusses the critical operations necessary to attain good quality products.

TRADITIONAL FOODS OF ETHIOPIA

ABEBA GOBEZLE AND LAKECH GOITOM

Ethiopian Health and Nutrition Research Institute
P.O.Box 5654, Addis Abada, Ethiopia

This paper briefly tries to give an explanation on traditional foods of Ethiopia with much emphasis on dietary patterns, special fasting foods, their nutritional aspect and traditional as well as modernization of food industry in the country.

Countries' dietary patterns vary from place to place due to differences in ethnicity, socio-economic classes, geographical, religion and other factors.

Ethiopian population traditionally consumes the following major foods: *injera* with *wot*, *dabbo, kitta, gogo, terosho, kocho, genfo, atmit, kollo* and *nefro.*

During fasting period, special fasting foods such as *silijo, azifa, shimbra asa wot* and fish are consumed. The nutritional value is highly improved by combining cereals and legumes.

The Faffa food factory and Central Food Processing Enterprise are the two main traditional food producers in Ethiopia. The Food Science and Nutrition Research Department of the Ethiopian Health and Nutrition Research Institute, through its continuous scientific research, assists in upgrading the nutritional content of commercial products.

TRADITIONAL FOODS OF BANGLADESH

PARVIN BANU CADI

Institute of Nutrition and Food Sciences
University of Dhaka, Dhaka, Bangladesh

Bangladesh has a rich cultural heritage of traditional foods. These foods are based on rice, rice and pulse, meat, fish, vegetables or milk and sugar. Some fruits are also used for pickles which add appetizing taste and flavour.

Traditional foods are strongly linked with cultural and religious events and also socio-economic and rural-urban features.

Very little work has been done on the nutritional value and the hygiencic status of the traditional foods prepared in rural Bangladesh. Enormous opportunities therefore exist to improve their quality through research.. Having done that and also keeping in mind the popularity and ready acceptability of traditional foods to the population, attempts should be made to prepare traditional foods on industrial scales.

TRADITIONAL FOODS IN KENYA

JASPER K. IMUNGI,

Department of Food Technology and Nutrition,
University of Nairobi, Kabete, Kenya

Kenyan communities are predominantly vegetarian, save for a few ethnic groups which practice a pastoralist way of life. This paper reports on the main traditional foods consumed by various communities, based on cereals, legumes, fruits, vegetables, meat, meat products, milk, milk products, fats and oils. Methods of preparation and the manner in which the foods are consumed are reported, especially to bring out any differences between the various communities.

SORGHUM-BASED TRADITIONAL FOODS IN SUDAN: PREPARATION AND QUALITY ASPECTS

E.A. ELKHALIFA

Department of Food Science and Technology,
University of Gezira, Medani, P.O.Box 20, Sudan

In the Savana and semi-arid regions of Sudan, sorghum is an important basic food cereal for millions of people, providing the bulk of calories, proteins, vitamins and minerals. In Sudan, sorghum consumption as food is in several forms such as fermented or unfermented food products.

The nutritional quality of sorghum varieties have been extensively evaluated for *lesra* making. Trials were made to enhance the nutritional quality of *lesra* by increasing the fermentation periods and or supplementation with protein rich sources. Fermentation produced a slight increase in protein content. Incorporation of edible groundnut meal produced significant improvement in protein content and protein quality over the traditionally fermented sorghum meal.

The preparation methods of traditional sorghum foods are described in detail. Their quality parameters are reviewed with special attention to nutritional improvement.

Future research should focus on addition of legume flours, as high protein sources, to improve nutritional quality of *lesra*.

PROFILES OF SOME TRADITIONAL FOODS OF NIGERIA

GABRIEL O. ADEGOKE

Department of Food Technology
University of Ibadan, Ibadan, Nigeria.

Nigeria, with a population of more than 100 million people, is blessed with traditional foods from different ethnic groups within the country. Both fermented and non-fermented plant foods and animal foods are used as traditional foods in Nigeria. While these traditional foods may have the same raw materials, however, processing techniques and naming of the final products differ at times from state to state and from one ethnic group to another.

Traditional foods like *suya, wara (warankasi)*, *kilishi(tinko)* are obtained from animal sources.

Some plant products from which traditional foods are produced include cassava (*Manihot esculenta* (Crantz), groundnut (*Arachis hypogaea* L.), maize (*Zea mays* L.), Sorghum (*Sorghum guineense*), millet (*Pennisetum typhoides*), cowpea (*Vigna unguiculata*), Yam (*Discorea* spp) and plantain (*Musa* spp). From these plant materials the following traditional foods can be prepared: *gari, fufu, akpu, lafun, danwa, kpokpogari* (tapioca cake), *ogi, okpa, pito, sekete, kokoro, aadun, kulikuli, dawadawa, egusi, sinasin, moin-moin, akara, iyan, iwuakpu, ipekese and dodo*.

Some of these foods have been commercialized using modern processing techniques.

THE INDONESIAN FERMENTED FOODS

PURWO ARBIANTO

Chemistry Department,
Bandung Institute of Technology Bandung, Indonesia

These fermentation food processes have evolved through the movement of people from one climatic zone to another or even migration from one continent to another, with the added complication of a complete change of substrate and environment. The essential feature is that the process has been retained as part of the cultural pattern of the people concerned. The strategy of indigenous fermentation is the development of the technique as a part of the philosophy of living with microorganisms, rather than building more barriers against the microbial world.

It based on the fact that an increased range of plant and animal materials can be made available to man as food, if the digestive systems of other organisms are employed to prepare the materials for humans. This is in contrast to the industrial approach in which the process is placed in a straight jacket, with the aid of heavy engineering and industrial chemistry, but at the expense of high energy consumption and pollution of the environment. This non-biological approach is alien to traditional fermentation.

This technique is widely used, both in large and small scale processes. As a technique amenable to decentralized and simple technology, recycling of useful wastes, etc., it already plays an important role in the economics of many countries.

THE INDONESIAN TRADITIONAL FOODS: FROM OBSURITY TO PROMINENCE

SLAMET SUDARMADJI

Gadjah Mada University, Yogyakarta, Indonesia

Indonesian traditional foods are getting a higher profile recognition. Some foods are successful in market and in acquiring technology development, but some are disappearing, for various reasons. *Tempe* and *kechap* are two traditional products which are becoming popular and providing economic benefits to the country. Based on raw material used, Indonesian traditional foods can be categorized into: carbohydrate, protein and spice based. The intricate connections between traditional foods with the economy of the common people must be understood and maintained. International research and coordination may be helpful to bring the traditional foods to more prominence for overall regional development.

KOREAN TRADITIONAL FOOD-*KIMCHI*

KYU SEOB CHANG

Department of Food Technology
College of Agriculture
Chungnam National University, Taejon City 305 764, Korea

Kimchi may be classified into two main types, namely seasonal *kimchi* and winter *kimchi*. There are many varieties of seasonal kimchi, depending on the availability of certain vegetables. In the spring, young cabbage *kimchi* and sliced radish *kimchi* have a refreshing taste. Cool cucumber *kimchi* and baby radish *kimchi* are the most popular in the warm summer. For the fall season, the whole Cabbage *kimchi*, diced radish *kimchi,* and pony-tail *kimchi* are favoured. Winter *kimchi* includes whole cabbage *kimchi*, whole radish *kimchi*, pony-tail *kimchi* and diced radish kimchi. The winter *kimchis* is prepared in early winter and last throughout the winter. However, owing to the development of green houses, vegetables are available all the year round and it is no longer necessary to prepare a large stock of *kimchi* to last throughout the winter months.

The popularity of *kimchi* is attributed to the unique blending and fermentation of vegetables, herbs, pickled fish, fresh seafood, and spices such as red pepper, garlic and ginger. *Kimchi* is rich in vitamins, proteins, and other essential nutrients and Koreans used to rely on it as a source of nutrients, when fresh vegetables were scarce in winter.

THE TRADITIONAL FOODS IN EGYPT: DEFINITION OF THEIR COMPOSITION AND HEALTH-PROMOTING QUALITIES

LAILA HUSSEIN

Department of Nutrition
National Research Centre, Giza-Dokki, Egypt

The traditional diet in Egypt is characterized by its high content of cereals, mostly wheat as well as vegetables and less of everything else. Onions, garlic and tomatoes in generous amounts are incorporated in most of the vegetables eaten. The gross total amount of cereals, vegetables and fruits may amount to 700 - 1000 g per adult per day. The traditional food is rich in many other nutrients and non-nutrients (such as fibre, carotenoids, polyphenols, glucosynolates, sulfites) present in plant foods. Vegetable oils are the major forms of separated fats and oils. Traditionally, boiled whole wheat (*Belila*) and germinated faba beans (*Foul Nabit*) were in common consumption. Cheeses (*Mesh*) were prepared from skimmed milk and stored for the whole year in porcelain pots with salt, citrus fruits, and hot paprica as conservatives. Fishes (*Melouha*) were conserved in high salt concentration together with sesame butter. These traditional food products were shown to be highly nutritious, palatable, cheap sources of high-quality protein and good sources of specific minerals and vitamins. The bioavailability of calcium of the above mentioned traditional foods was shown to be superior than when consumed raw. The upgrading in the quality of the traditional foods is attributed partially to the catalytic action of specific microorganisms.

Recent nutrition surveys illustrated that the traditional life styles is geographically-dependent and still maintained in the remote areas. The trend for the possible time evolution of the dietary habits from typically traditional to a much more westernized diet highlight the urgent need for a long strategic policy, based on better social and commercialized marketing of the traditional foods.

TRADITIONAL FOODS - THE INDIAN SCENARIO

J. V. PRABHAKAR

Lipid Science and Traditional Foods Department
Central Food Technological Research Institute
Mysore - 570 013, India

Traditional foods are an inseparable part of a country's culture. Though factors such as raw materials and their seasonal availability influence the type of foods, ancient wisdom has steered the formulation and preparation of traditional foods with focus on what is good for the body. While the traditional foods remained localised due to the restricted communication and transport in the past, fast pace of urbanisation, communication, transport, small family norms, pressure on time and such other reasons have necessitated changes. These factors open up many challenges and opportunities. The expanding opportunities for producing and marketing traditional foods are stretching the once localised raw materials to the demands of a larger population. The traditional foods were essentially meant for consumption in fresh state and were not designed for the present urban needs of convenience, assurance of safety, stand up to packaging, storage and marketing.

Transforming home scale and cottage scale efforts for producing traditional foods into large scale operations creates opportunities specially for newer food industries. Application of science and technology to overcome problem bearing on traditional foods has a important role in this transformation.

Session V
March 7, 1997

CASE STUDIES

(Includes abstracts received upto 1.3.1997)

Friday the 7th March 1997

SESSION V: **CASE STUDIES**

Venue: Assembly Hall , Main Mansion

Chairperson	: M.M. Krishnaiah
Co-Chairperson	: D. Rajalakshmi
Rapporteurs	: K.K. Sakariah
	: Abeba Gobezie

4.00 PM **Production and Commercialization of *Woaguchi*, a Beninese Soft Cheese**

Montairou Egounlety, Abomey - Calavi, Benin

4.10 PM **Upgrading Traditional Food Processes and Products: The Case Study of Fermented Cereal Products**

S. Sefa-Dedeh, F.K. Saaliah and E. sakyi - Dawson Legon, Ghana

4.20 PM **How a traditional Ethiopian food, *Ensete*, made it into the city**

Abeba Gobezie and Frew Tekabe, Addis Ababa, Ethiopia

4.30 PM **Utilization of Whey Protein Concentrates as Emulsifier and Stabilizer**

G. Muschiolik, S. Gunsel, H.M. Rawel and I. Scherze, Bergholz-Rehbrucke, Germany .

4.40 PM **Commercialization of Traditional Foods in Kenya: A Case Study of Fermented Milk**

Jasper K. Imungi, Kabete, Kenya

4.50 PM **Use of Lactic Acid Bacteria Simultaneously Producing Amylase, Linamarase and Lysine for the Amelioration of *Garri*, a Fermented Food Produced from Cassava, *Manihot esculenta* Crantz**

Nduka Okafor, Enugu, Nigeria

5.00 PM **Traditional Foods of Bangladesh: Case Study**

Parvin Banu Cadi, Dhaka, Bangladesh

5.10 PM **Indonesian Traditional Foods - A Case Study**

Purwo Arbianto, Bandung, Indonesia

5.20 PM **(Title awaited)**

Paulina Zharare, Harare, Zimbabwe

5.30 PM **(Title awaited)**

J.P. Tamang , Gangtok, India

5.40 PM to 6.00 PM **DISCUSSION**

Saturday the 8th March 1997

SESSION V:
Continued . . .

CASE STUDIES

Venue: Assembly Hall , Main Mansion

Chairperson : V. Prakash
Co-Chairperson : K.S. Chang
Rapporteurs : G. Ramanatham
: Purwo Arbianto

8.30 AM **Commercialization of *Geplak:* Case Study of a Traditional Food**
Slamet Sudarmadji, Yogyakarta, Indonesia

8.40 AM **Changes in Textural Properties of *Jeung-Pyon* (Korean Traditional Fermented Rice Bread) During Storage**
K.S. Chang, Taejon City, Korea

8.50 AM **Research and Development of Soysauce Industry in Japan**
Tamotsu Yokotsuka, Chiba - ken, Japan

9.00 AM **(Title awaited)**
G.G. Kahng, Chinju City, R.O.Korea

9.10 AM **A Case Study on Process Development for Manufacturing Vinegar, a Traditional Fermented Seasoning in Korea**
Peong-Ug Ahn, Seoul, Korea

9.20 AM **(Title awaited)**
M.P. Vaidehi, Bangalore, India

9.30 AM **Traditional Foods by Microbial Processes**
M.C. Varadaraj and R. Joseph, Mysore, India

9.40 AM **Malted Weaning Food - A Case Study**
N.G. Malleshi, Mysore, India

9.50 AM **Traditional Oilseed Based Foods**
M.C. Shamanthaka Sastry, Mysore, India

10.00 AM **Product Positioning of *Bhujia* - A Case Study**
D. Rajalakshmi and Nagin Chand, Mysore, India

10.10 AM **Packaging of Indian Traditional Foods - A Case Study**
K.R. Kumar, Mysore, India

10.20 AM **Functionality of an Acidic Mucilagenous Polysaccharide from Blackgram in Traditional Food - *Idli***
R.N. Tharanathan, Mysore, India

10.30 AM **Tea**

Saturday the 8th March 1997

SESSION V:
Continued . . .

CASE STUDIES

Venue: Assembly Hall , Main Mansion

10.45 AM **Production of *Kachampulli*, a Traditional Product from Malabar Tamarind (*Garcinia cambogia*)**
M.C. Misra and S.P. Manjrekar, Mysore, India

10.55 AM **Raw Mango Powder (*Amchur*) - A Case Study**
W.E. Eipeson , S.P. Kulkarni, M.R. Vijayalakshmi and R.S. Ramteke, Mysore, India

11.05 AM **Processes and Machinery for Traditional Foods**
Suvendu Bhattacharya and A. Ramesh, Mysore, India

11.15 AM **Developments in Wheat-based Indian Traditional Foods**
P. Haridas Rao, Mysore, India

11.25 AM ***Tandoori* Chicken - Indian Traditional Food**
K.K.S. Nair, P. Puttarajappa and D. Narasimha Rao Mysore, India

11.35 AM **Production of Fresh Ginger Candy**
S.R. Sampathu, N. Krishnamurthy, H.B. Sowbhagya Mysore, India

11.45 AM **Indian Traditional Sweetmeats - A Case Study**
Yella Reddy, S. Jayarani and J.V. Prabhakar Mysore, India.

11.55 AM **Insect Pest and Infestation Management in Traditional Foods Manufacture and Storage - A Case Study**
S. Rajendran and K.S. Narasimhan, Mysore, India

12.05 PM **Human Resource Development at CFTRI in the Context of Traditional Foods**
S. Godavari Bai, Mysore, India.

12.15 PM **Microbiological Quality of Traditional Sweetmeats of India**
J.S. Sandhu and M.N. Krishnamurthy, Mysore, India .

12.25 PM **Commercialization of Traditional Foods - The Indian Experience with Special Reference to Dairy Foods**
Vijay Sood, New Delhi, India

12.35 PM **Commercialization of Indian Traditional Foods : *Jeelebi, Laddu, Bakervadi***
S.R. Chitale, Pune, India

12.45 PM to 1.20 PM **DISCUSSION**

1.30 PM **Lunch**
Venue: IFTTC Auditorium

PRODUCTION AND COMMERCIALIZATION OF *WOAGACHI*, A BENINESE SOFT CHEESE

MOUNTAIROU EGOUNLETY

Departement de Nutrition & Sciences Alimentaires
Faculte des Sciences Agronomiques
Universite Nationale du Benin
Abomey-Calavi, Benin

Woagachi or *Wara* is a soft unripened cheese produced in Benin and Nigeria by coagulating cow's milk with a vegetable rennet (calotropain) from sodome apple tree (*Calotropis procera* Alt. Alt.f). The cheese is regarded as an important source of protein as it may replace meat or fish or be used in combination with these animal proteins in various food recipes.

Production of *woagachi* is an income-generating activity mainly practised by women. Production is estimated at more than 2000-2500 t/year. With its wide commercialization network, cheese produced in the north of the country is consumed in the whole of the country and in the neighbouring countries, including Togo and Ghana. Cheese price varies from 500-700 F CFA/kg in production areas to 1000-1500 F CFA/kg in the towns.

UPGRADING TRADITIONAL FOOD PROCESSES AND PRODUCTS : THE CASE STUDY OF FERMENTED CEREAL PRODUCTS

S. SEFA-DEDEH, F.K. SAALIAH and E. SAKYI-DAWSON

Department of Nutrition and Food Science
University of Ghana, Legon, Ghana

Fermented cereal products are important in the food economy of Ghana. Products such as *gakenkey (komi*), *fante kenkey*, steamed *abolo* and baked *aboloo*, *maasa* and *hausa koko* are produced by women-controlled micro enterprises and provide employment and income to the food processors. The production of these fermented foods involves the use of simple unit operations which may be laborious, time-consuming and energy inefficient. One such operation is the process of *'aflatization'* which leads to the production of '*aflata*', a mixture of cooked and uncooked dough. This process is laborious and yet very essential to the development of good quality products.

Extrusion technology was applied to reduce the processing time and the drudgery associated with *ga kenkey* and *hausa koko* production through the use of pre-gelatinized fermented flour. Evaluation of the resulting products indicated that while the processes lead to production of flour which could cut down on processing time and the drudgery, the resulting products have not scored the same as the traditionally processed products. It however, demonstrated the potential of upgrading the traditional technology. The paper discusses the approach used and the evaluation of the process and products.

HOW A TRADITIONAL ETHIOPIAN FOOD, *ENSETE*, MADE IT INTO THE CITY

ABEBA GOBEZIE and FREW TEKABE

Ethiopian Health and Nutrition research Institute, P.O. Box 5654, Addis Ababa, Ethiopia

Ensete (Ensete ventricosum) is one of the most important locally domesticated and cultivated food plants in Ethiopia. It is sometimes referred to as the 'false banana' due to its striking resemblance to banana plant. *Ensete* is widely grown in densely populated Southern and South Western parts of Ethiopia. More than 10 million people in Sidama, Gedeo, Wolayita, Gurage and Kembata Zones of Ethiopia use *ensete* as a source of food and it also constitute an additional source of income from the sale of fibre. *Ensete* plant has a great potential as a food security crop in Ethiopia. Almost all parts of *ensete* plant are used one way or another. The fibre is used for making ropes, mats, sieves and bags, including as a supplement in commercial fibre factories. The bark is used in house construction and as fire wood. The fresh and dried leaves of *ensete* are used for thatching temporary shelters, as bed covers or mats, and as plates for serving food of all sorts during festival.

The carbohydrates from the two principal *ensete* products, *Kocho* and *Bulla*, meet more than 80% of total energy intake of the *ensete* culture. Furthermore, the use of *ensete* products is expanding to many urban centres. The spread of these foods could be attributable to its social and cultural values among the cultivators, especially the Gurage ethnic group who wander from place to place in search of business opportunities. *Ensete* has a significant place in the community. However, harvesting, processing and preparation of *ensete*, which are entirely women's responsibility, are tedious and time-consuming. This calls for an intensive research to improve the processing aspect of the crop. In view of its expansion to the urban centres and its future potentials *ensete* deserves more attention from agriculturists and technologists.

UTILIZATION OF WHEY PROTEIN CONCENTRATES AS EMULSIFIER AND STABILIZER

G. MUSCHIOLIK, S. GUNSEL*, H.M.RAWEL* AND I. SCHERZE

German Institute of Food Technology,
Biopolymer Functionality Research Group,
**University of Potsdam*
A-Scheunert-Allee 114-116, D-14558 Bergholz-Rehbrucke, Germany

Many traditional foods are based on emulsions (oil in water) and a a number of these are made by using egg yolk as emulsifier. Alternative additives are necessary to get the same quality for preparing such traditional emulsions (mayonnaise, sauces) under industrial scale by using high shear forces such that a good storage stability at different temperatures is obtained.

One possibility is to substitute egg yolk (egg lecithin) by another natural emulsifier, the whey protein. Different whey protein modifications are possible to produce such emulsions with tailor-made properties.

The report shows the influence of different whey protein modifications (partially denatured) on emulsion properties and demonstrates the influences of such proteins on the emulsion type, creaming rate, phase separation, viscosity and consistency of emulsion systems. In comparison to vegetable proteins, a higher amount of whey protein has to be added to the emulsions for getting a high viscosity and greater consistency.

Modified whey proteins are suitable functional components to support the production of traditional emulsified foods on industrial scale. It is of importance to select the right protein modification and to have a good knowledge on the function of such protein additives. Furthermore, specific information on interactions with other components (salt, acid, carbohydrates) is necessary to guarantee a constant food quality.

COMMERCIALIZATION OF TRADITIONAL FOODS IN KENYA : A CASE STUDY OF FERMENTED MILK

JASPER K. IMUNGI
Department of Food Technology and Nutrition,
University of Nairobi, Kabete, KENYA

Milk, mainly from the cow, but also from the goat; has been traditionally fermented and consumed by virtually all Kenyan communities for a long time. Known by various names, it is consumed in different forms depending on the community. Also milk has been available in few restaurants and milk bars, where it is vended unpackaged and consumed either alone or in accompaniment with foods, like cakes, buns and meat pies.

The study carried out in this department in 1983, led to standardization of the fermentation by selecting lactic acid bacteria to obtain a product of good consistency and flavour as desired by Kenyans. In 1985, the first industrial commercialisation of the fermented milk was initiated by Kenya Cooperative Creameries (KCC), with production of 70,000 litres per day. The industry has since then grown, with new processors coming in due to liberalization of the milk industry.

To-date, up to 2 million litres of the product is industrially produced and vended. This paper reports on the developments of this industry.

USE OF LACTIC ACID BACTERIA SIMULTANEOUSLY PRODUCING AMYLASE, LINAMERASE AND LYSINE FOR THE AMELIORATION OF GARRI, A FERMENTED FOOD PRODUCED FROM CASSAVA, *MANIHOT ESCULENTA* CRANTZ

NDUKA OKAFOR
Nnamdi Azikewe University
Awka, Enugu, Nigeria
Kabete, KENYA

Garri is a staple food derived from cassava for about 200 million people in West Africa. It is produced by fermenting mash derived from grated cassava. The two major deficiencies of cassava are low protein and free amino acid content, as well as the presence of the piosonous cyanogenic glucoside, linamarin. These two deficiencies are carried over into *garri* during processing, i.e, the food thus contains very little protein and free amino acid, in addition to containg small quantities of linamarin.

While large quantities of linamarin in a food could be fatal, small quantities have been implicated in such diseases as goitre and tropical ataxic neuropathy in prolonged consumption in low protein diets.

The flavour of *garri* has been identified as being produced by lactic acid bacteria and yeasts. These two groups of organisms require free sugars. This work was done to ameliorate garri quality through microbiological means, i.e., to remove any remaining linamarin in the mash and simultaneously introduce lysine, an essential amino acid notoriously lacking in carbohydrate foods, while retaining the usual flavour of *garri*. The work consisted of searching for organisms which could simultaneously secrete amylase (to produce sugars on which the flavour-producing lactic acid bacteria would thrive), linamarase (which would hydrolyze any traces of linamarin in the food), and lysine,

which would increase the content of this important amino acid, in the food. One hundred and fifty organisms were studied, of which only five bacteria had the ability to produce the two enymes, as well as lysine simultaneously. *Garri* produced by the inoculation of the organisms was found to be free from linamarin, contain high amounts of lysine, and have an acceptable flavour.

TRADITIONAL FOODS OF BANGLADESH : CASE STUDY

PARVIN BANU CADI

Institute of Nutrition and Food Sciences
University of Dhaka, Dhaka, Bangladesh

Being a rice eating country, the traditional foods of Bangladesh are mainly rice-based. Major traditional foods include boiled rice (*bhat*) as major food item, while flaked rice (*cheera*) and puffed rice (*muri*) as breakfast and snack items, in addition to rice cake. The production is confined to house-holds and industrial production is insignificant.

Commercial production of both flaked and puffed rice is limited to small scale cottage industries, with little modernization. The processing is manual, except for a unit which uses imported equipments from Japan. The machinery used for production of flaked rice is described, along with marketing strategies of the product and the labour-intensive nature of the processing units.

INDONESIAN TRADITIONAL FOODS - A CASE STUDY

PURWO ARBIANTO

Chemistry Department, Bandung Institute of Technology
Bandung, Indonesia

A case study is presented on the latest development in the *tempe* fermentation. It underlines the mixed cultures aspects of natural fermentation and changing the environmental conditions to reach the desired effect. The final taste of the product is entirely dependent on the location of the processing plant.

The indigenous fermentation techniques suit very well to serve as a base on which to build upon new alternative technologies.

COMMERCIALIZATION OF GEPLAK: CASE STUDY OF A TRADITIONAL FOOD

SLAMET SUDARMADJI
Gadjah Mada University,
Yogyakarta, Indonesia

Geplak is a traditional food based on coconut and sugar. The marketing of *geplak* is very limited because of short shelf -life, irregular shape, lack of packaging and general sanitary measures. With a small research grant programme, some of the *geplak* producers are now capable in overcoming the problems. Longer shelf life, rather uniform shapes and neatly packaged *geplak* products are available in the market. To get into a wider marketing distribution a lot more improvement programmes are still needed.

CHANGES IN TEXTURAL PROPERTIES OF *JEUNG-PYON* (KOREAN TRADITIONAL FERMENTED RICE BREAD) DURING STORAGE

KYU SEOB CHANG

Department of Food Technology
College of Agriculture
Chungnam National University, Taejon City 305 764, Korea

This study was carried out to investigate the storage conditions and methods required for commercialization of *Jeung-pyon*. The storage characteristics of *Jeung-pyon* were examined with Universal Testing Machine (UTM, Instron model 1000) for textural properties during storage under the conditions such as sealing, nonsealing, and at different temperatures. The differences in storage characteristics on the different varieties and years of rices were not visible. When the *Jeung-Pyon* lost its commercial marketability, the measured value of UTM that increased were: hardness 0.74 kg to 1.0 kg, gumminess 0.23 kg to 0.59 kg, chewiness 6 kg mm to 18 kg mm. The parameters decreased were: adhesiveness 0.65 kg mm to 0.40 kg mm, cohesiveness 0.61 kg to 0.34, springiness 41 mm to 32 mm. The nonsealed *Jeung-Pyon* lost its quality on storing at room temperature because of the case-hardening after 2 days. In the case of sealed Jeung-Pyon, the case-hardening phenomena by evaporation of moisture did not occur, therefore sealing was a significant factor for an extension of shelf life. The shelf-life of sealed *Jeung-Pyon* was 20 days and 5 days, respectively, during storage at -20°c and 20°c. The sealed *Jeung-Pyon* stored at 5°C lost its quality, as a consequence of retrogradation of starch. The *Jeung-Pyon* sealed with air and moisture-proof packaging material and stored at the accelerated condition at 92% R.H. and 35°C lost its quality within two or three days.

RESEARCH AND DEVELOPMENT OF SOYSAUCE INDUSTRY IN JAPAN

TAMOTSU YOKOTSUKA

Kikkoman Corporation
399 Noda, Noda-shi, Chiba-ken, 278 Japan

One Japanese person consumes about 10 liter *shoyu*, or fermented soybean and wheat sauce, a year. The fundamental manufacturing method of *shoyu* of today was established some 400 years ago. Principal characteristics of the then established principles of *shoyu* making were: (1) a mixture of almost equal amount of soybeans and wheat kernels was adopted as raw material, (2) the total substrate was cultured with yellow *Aspergillus* mold to make koji, (3) the mixture of koji and salt water in slurry, or salty mash, was vigorously fermented with lactic acid bacteria and yeasts and (4) the final product was pasteurized at 60-70 °C to give it a clear reddish brown color and pronounced cooked flavor, or fire flavor in case of Koikuchi, deep colored type of *shoyu*.

The predominant technological progresses achieved during about 30 years after the World War II include: (1) application of defatted soybean grits instead of whole beans, (2) the remarkable increase of enzymatic digestibility of proteins in raw materials from 60 to 90% and (3) the reduction of fermentation period from over one year to about 6 months. The improvements in heat treatment of raw materials, especially that of soybeans, and temperature and microbial control of koji making as well as salty mash fermentation have predominantly contributed to the above progresses.

The identification of dominant microbes and enzymes taking part in koji making and salty mash fermentation, the key flavor components, the chemical and microbial stability, the hygienic safety, and the reduction of salt concentration of the final product, have been studied.

A CASE STUDY ON PROCESS DEVELOPMENT FOR MANUFACTURING VINEGAR: A TRADITIONAL FERMENTED SEASONING IN KOREA

PEONG-UG AHN

The Greetings Corporation,
Kyoungil Bldg (Suite 201) 257-5 Yangjae-Dong
Socho GU, Seoul, Korea

Vinegar is one of the most widely used traditional fermented liquid seasonings in Korea. Basically, two methods are employed for its manufacturing, i.e., traditional process by surface culture and industrial process by submerged culture.

In traditional process, crushed fruits and cooked grains are used as starting materials. Sequential fermentations of ethanol and acetic acid naturally take place by untrained wild microorganisms growing on the fruit juices and cooked grain mash (mainly rice). Therefore, it requires a long fermenting time (at least 6 months) to reach a final acidity of vinegar, with less than 4% of acetic acid.

In Industrial process, batch-type fermenters are generally used for submerged culture and vinegars with about 5 - 7% of acetic acid are produced by batch operation.

A modified submerged culture was designed for rapid mass production of very high acidity vinegar. Air-lift type fermenters were hired, and the strain employed was highly purified and well trained acetic acid bacteria were used. The submerged culture by semi-continuous operation made it possible to guarantee a production of high acidity vinegar with over 18% of acetic acid. This study enables us to conduct an automated vinegar fermentation and now some measuring devices have been employed for on-line monitoring and controlling the high acidity vinegar fermentation on a large industrial scale.

TRADITIONAL FOODS BY MICROBIAL PROCESSES

M.C. VARADARAJ and RICHARD JOSEPH

Department of Food Microbiology
Central Food Technological Research Institute
Mysore-570 013, India

Lactic fermented traditional products, like *idli, dosa, appam, kadhi, dhokla, warri, adhirasam* and *dahi*, are very popular and have been in use from ancient times. Often, these food items are inconsistent in their quality attributes and are prone to undesirable microbial deterioration. This has been mainly due to the inherent natural fermentation, improper process parameters and poor concepts of hygiene and sanitation. A few of these problems were attempted in our laboratory on the following lactic fermented traditional foods :

Kadhi : A milk-based fermented culinary food item.

Dhokla : A cereal/legume-based fermented and steamed snack food item.

Punjabi warri : A legume-based fermented and dried product.

Lassi : A popular lactic fermented milk beverage prepared from *dahi*.

Cultural conditions were optimised to obtain higher antibacterial activity from the natural isolates of *Lactobacillus* spp., which have shown broad spectrum antibacterial activity. These antagonistic isolates of *Lactobacills* spp. were effective in suppressing growth of food poisoning and spoilage bacteria in the above fermented products, when introduced as pre- and post-processing contaminants. Storage studies indicated the products to be microbially safe and had sensory acceptability.

In the present social set up and the growing awareness among the consumers to obtain food products of desirable and uniform quality, combined with safety for human health, it becomes necessary to emphasise on the use of desirable starter bacteria.

MALTED WEANING FOOD - A CASE STUDY

N.G. MALLESHI

Department of Grain Science and Technology
Central Food Technological Research Institute
Mysore-570 013, India

Preparation of weaning foods, based on the traditional technology of cereal malting is followed in Asia and Africa. The weaning food prepared from finger millet in South India is known as *wodd ragi hittu* or *huri hittu*. The shortcomings of the traditional method of preparing malt food from millet were overcome by optimising the soaking time (16 h), germination period (about 48 h), drying the sprouts to about 14% moisture, detaching and separating the rootlets, kilning the green malt at about 65°C, spraying the malt with 7% additional water, pulverising and sieving the meal through 60 mesh screen. The malt flour obtained by following this method is rich in malt enzymes, 95% free from fibrous seed coat and contains carbohydrates as well as proteins of improved digestibility, besides possessing agreeable taste and aroma.

Two parts of the millet malt, blended with one part of toasted or malted legume, preferably *mung* bean flour, form nutritionally balanced weaning food, popularly known as Malted Weaning Food (MWF). The MWF was readily accepted and tolerated by weaning infants and exhibited good growth promoting quality.

The technology is cost effective and has not only found commercial application, but also received the attention of the concerned from abroad. The millet can be substituted by wheat, sorghum, rice or barley depending upon the availability.

TRADITIONAL OILSEED BASED FOODS

M.C. SHAMANTHAKA SASTRY

Department of Protein Chemistry and Technology
Central Food Technological Research Institute
Mysore-570 013, India

Traditionally, oilseeds are processed to obtain oil and the residue is used for the preparation of traditional food purposes. Extraction of oil is done by *ghani* processing in rural sectors. There are nearly 2,50,000 units, mostly located in villages. Consumer's preference for *ghani* pressed oil is for its virgin flavour. Efforts have been directed towards the improvement of *ghani,* without altering the method of extraction. Dehulling of oilseeds, especially sesame seeds, is traditionally carried out at homescale and in cottage industries, to get dehulled kernels for snack foods, confectionery and oil.

Under traditional food processing, unit operations such as , drying, roasting, salting, shaping, baking and pickling are followed. Many of these techniques have become an art of food preparation, and are adopted in roasted/ salted/ deep fat fried groundnuts, puffed beans, sweets coated with dehulled sesame seeds, nutty biscuits, coconut *burfies* and bakery products. Although these unit operations lead to enhanced palatability, imparting appealing characteristics and increased shelf-life, they have not effectively overcome the problems such as delayed cooking, removal of antinutritional factors, toxic factors, poor digestibility and flavour profile.

Advanced Technologies have been applied for improving the art - based traditional technologies, resulting in the development of different methods of dehulling procedures, extraction of oil, detoxification techniques, removal of nutty or beany flavours and making the products more nutritious. Various types of traditionally oriented snack foods such as *revadi/ chakkis, halwa, chutney* powders, dry roasted flours from different oilseeds and pulses, weaning and supplementary foods, *chewra, paneer*, biscuits and other diversified products have been developed for facilitating for conservation of energy and uniform quality on large scale. These aspects are discussed in detail.

PRODUCT POSITIONING OF *BHUJIA* - A CASE STUDY

D. RAJALAKSHMI and NAGIN CHAND
Sensory Science Department
Central Food Technological Research Institute
Mysore-570 013, India

India has a rich variety of traditional foods of varied colors, pleasant aroma complexes, delicate textures and tastes. There are two major types of such foods. The first type includes foods with more moisture, which need to be consumed within a short interval after preparation. e.g., *dosa, idli, samosa, pakoda and batura.* The second type includes those foods which can be stored for a week or fortnight. Most of the snack foods, savory and sweet-meats fall into the latter category. This class of foods is important as the foods have a great potential to be developed into processes, with faithful reproduction of sensory quality, for industrial exploitation. Several such foods and their preparation details, in the form of flow sheets and equipment required for the preparation have been documented in the publication of the Intermediate Technology Development Group, UK.

Every traditional food has its characteristic, individualistic sensory properties, which are rather very special to it. Typical examples are *pheni, chiroti, Mysorepak, potharekulu, Bombay halwa, laddu, bhujia* and so on. Of these, *laddu* and *bhujia* are known all around the country and hence, a case study has been presented on *bhujia* here.

Bhujia is a salty and spicy, extruded deep fat fried product from Bengalgram flour dough. It is golden brown in colour, crisp and snappy in texture. It is a low moisture product. The general process has been described and methods for sensory profiling have been developed. Market samples have been evaluated and positioned. Attempts to develop a similar product with alternative ingredients have succeeded and the profiles of the optimum product have been presented. The final acceptance of the product has been confirmed through pilot consumer study.

TRENDS IN THE PACKAGING OF TRADITIONAL FOODS - A CASE STUDY

K. R. KUMAR

Department of Food Packaging Technology
Central Food Technological Research Institute
Mysore-570 013, India

Demand for packaged traditional foods is increasing due to demographic changes, such as urbanization, proliferation of nuclear families and changing life-styles. Traditional foods form an indispensible part of the dietary of the population. In recent years, the growth in export markets has increased due to the preference for traditional sweet, savoury and snack food items.

Major factors hindering the development of traditional foods are uncertainty with regard to shelf-life and proper packaging methods. In recent years, flexible packaging materials are becoming increasingly popular due to logistic advantages, such as economy, functionality, light -weight and convenience. Further, use of flexible packages will help in establishhing "Brand image" in export market and is also a promising line for higher unit value realization. Hence, there is a need to develop cost-effective and functional packages for traditional foods.

In general, traditional foods are highly sensitive to the vagaries of climate and are prone to various changes, which include caking, lumping, loss of colour as well as essential oils, rancidity and browning reactions. Also they are susceptible to microbial growth and insect attack during storage and distribution. Various types of films and multi-layer structures have made significant strides in food packaging and has made it possible to select right type of material for specific applications. The research findings on current packaging methods and packaging requirements of typical traditional foods such as snacks, instant mixes, spice products and sweets, based on sugar and milk, are presented in the paper. Use of indigenously available materials, packaging systems and methods for these foods are also discussed.

FUNCTIONALITY OF AN ACIDIC MUCILAGINOUS POLYSACCHARIDE OF BLACKGRAM IN THE TRADITIONAL FOOD - *IDLI*

R. N. THARANATHAN

Department of Biochemistry and Nutrition
Central Food Technological Research Institute
Mysore-570 013, India

Blackgram (*Phaseolus mungo*) is traditionally used in the preparation of South Indian breakfast foods, such as *idli* and *dosa*, which are relished for their soft and spongy texture. The components responsible for these properties are the surface-active proteins which support the foam generated during auto-fermentation of batter. This imparts a porous structure to the product.

The viscogenic, mucilaginous polysaccharide (4.5%) stabilizes the porous structure against thermal disruption during steaming. The TCA (10%) extracted polysaccharide is composed of L-rhamnose, L-arabinose and D-galactose, in the molar ratios of 1:9:3, respectively, together with 19.5% of D-galacturonic acid.

During fermentation of blackgram, the polysaccharide undergoes both compositional and rheological changes. The fermented polysaccharide had a relatively higher degree of branching, which manifested in its overall higher viscosity and consequently the better product-making qualities.

The homogenous polysaccharide, obtained from comparable fractions of native and fermented blackgram, showed a close resemblance to pectic polysaccharide and suggested that it possesses a L-rhamno-D-galacturonan core, substituted by highly branched side chain stubs of L-arabinofuranose and D-galactose. The uronic acid carboxyls were atleast partly involved in maintaining the solution viscosity and functional property attributes, as the carboxyl-reduced polysaccharide (GalA < 1%) was devoid of both these characteristics.

PRODUCTION OF *KACHAMPULLI*, A TRADITIONAL PRODUCT FROM MALABAR TAMARIND (*GARCINIA CAMBOGIA*)

M. C. MISRA and S. P. MANJREKAR

Fermentation Technology and Bioengineering Department
Central Food Technological Research Institute
Mysore-570 013, India

Kachampulli, a traditional souring agent prepared from monsoon crop of Malabar tamarind (*Garcinia cambogia*), is used in *Coorgi* culinary dishes.

Traditional method of its preparation involves the softening of the fruits in specially made baskets, pressing with wooden roller to extract the juice and concentrating it by open pan evaporation in earthern-ware pots. The traditional product, taken generally with non-vegetarian preparations, is dark black in color, thick, viscous paste which is sour to taste. Local people consume a large amount of animal fat and there is a wisdom in using *Kachampulli* with pork preparations, as *Garcinia cambogia* is known to contain de-hydro citric acid, well known for its serum cholesterol lowering property.

The traditional method of preparing *Kachampulli* was modified by using pectinase enzyme to avoid the rotting of fruits, and concentrating in open pan or vacuum evaporators. The experiences of processing a 100 kg batch at CFTRI and smaller batches at rural level, along with traditional method, are presented.

An integrated process, utilising seeds, placenta and fruit residue to make the process more economical, is suggested.

RAW MANGO POWDER (*AMCHUR*) - A CASE STUDY

W. E. EIPESON, S.P. KULKARNI, M.R.VIJAYALAKSHMI and R.S. RAMTEKE

Fruit and Vegetable Technology Department
Central Food Technological Research Institute
Mysore-570 013, India

Mango (*Mangifera indica* L) occupies the envious position as the king among tropical fruits. India is the largest producer of mangoes in the world, with an annual production of about 10 million tonnes. Unlike many other fruits, mango in its raw stage is also used for preparing several products, raw mango powder, commonly called *amchur* and used widely as a food acidulant, being one of them. *Amchur* has been produced from a very long time by sun drying. In addition to mature green fruits, 'dropped' mangoes are also used. Fruit drop in mango can be as high as 75% from the stage of fruit set and only those in the later stages of maturation are suitable for preparing *amchur*.

In the conventional method of preparation of *amchur*, green mangoes are washed, peeled, cut into small pieces, sun dried and ground in a hand grinder to obtain *amchur*. Since the material is exposed to varying atmospheric conditions during drying, it accumulates dust and dirt . Also, due to the use of dropped fruits of non uniform maturity, the final product quality varies considerably and sufferes from poor quality.

For developing commercially viable technology for producing consistent quality *amchur*, considerable R&D work has been done on various aspects like screening of different varieties of mangoes, fixing the maturity indices, development of peeling and slicing equipment, standardisation of pre-treatments like blanching; dehydration parameters like tray loading, temperature, humidity and final moisture content. Mositure sorption characteristics of the product to select suitable packaging materials have also been established and the quality standards for the product have been fixed. The above aspects are discussed in the paper.

PROCESSES AND MACHINERY FOR TRADITIONAL FOODS

SUVENDU BHATTACHARYA and A. RAMESH

Department of Food Engineering
Central Food Technological Research Institute
Mysore-570 013, India

The paper highlights some of the recent developments in machinery and processes related to Indian traditional foods. The engineering properties, determined for such foods, are also discussed in brief.

Considering the importance of the machinery for the large scale production of common traditional foods, a number of machines have been developed. To name a few, continuous *chapati* (unleavened Indian flat-bread made from whole wheat flour), *dosa* (sheet of fried fermented batter of rice-blackgram), *idli* (steam-cooked fermented batter of rice-blackgram) making machines, roasting/puffing units and the continuous rice cooker, are important.

The suitability of different machines to manufacture several traditional foods have been investigated. The processes for making snacks have been simplified using extrusion technology or by roasting. The added advantage lies in low fat content in these products, as compared to traditional ones. The application of an encrusting machine to develop coated foods is encouraging.

The investigation on the role of different engineering properties on process design is in progress. As an example, the rheology of the batters from Bengalgram to prepare *boondi* (spherical product obtained by frying the batter), and rice-blackgram (to prepare *dosa*) are discussed. The future research will be aimed at the development of hot air roasters, groundnut blancher and *laddu* (balls made with sugar-soaked *boondi*) forming machines.

DEVELOPMENTS IN WHEAT BASED INDIAN TRADITIONAL FOODS

P. HARIDAS RAO

Flour Milling, Baking and Confectionery Technology Department
Central Food Technological Research Institute
Mysore-570 013, India

The present Indian wheat production is estimated at 65.6 million tonnes. About 50 million tonnes of the total wheat produced is processed into whole wheat flour using plate mills (*chakkies*) for use in the preparation of various traditional products like *chapati* and its *varients* like *parotta, phulka, roti* and *poori*. These products form the staple diet of a majority of the population of India and neighbouring countries. About 7 to 8 million tonnes of wheat is processed in roller flour mills into refined wheat flour (*maida*) and semolina (*soji*). *Maida* forms a major raw material for the preparation of bakery products. It is also used in some of the traditional products, like *nan* and South Indian *parotta*.

The major problems for the institutionalised preparation of Indian traditional products are the lack of information on the type of wheat, appropriate milling process, quality characteristics of flours suitable for different products, rheological properties of doughs for mechanisation, functions of flour constituents, influence of ingredients, processing conditions and ways as well as means of extending the shelf-life of products for marketing them in unit packs.

Research work carried out at CFTRI on many of the aspects mentioned above for *chapati, puri, parantha, roti* and other traditional products is discussed.

A STUDY ON *TANDOORI* CHICKEN- INDIAN TRADITIONAL PRODUCT

K.K.S. NAIR, P. PUTTARAJAPPA and D. NARASIMHA RAO

Department of Meat, Fish and Poultry Technology
Central Food Technological Research Institute
Mysore-570 013, India

Tandoori chicken, a popular traditional product in India, is a dressed and marinated chicken, toasted or baked in a special oven known as *Tandoor*. The product is a common menu in public eating places and occasionally prepared at homes.

The major steps in traditional processing of *tandoori* chicken are selction of the bird, marination and baking. The problems which exist in the traditional processing include : non-uniformity in the size of the dressed chicken, undefined recipe formulation, unspecified marination period, uncontrolled temperature time during baking, charring and contamination of the product with ash in the traditional *tandoor*. These defects affect the product quality and marketability of the product. There is no standard process for preparation of *tandoori* chicken. This limits the large industry to venture into this business. Therefore, there is a need to optimise the process for making *tandoori* chicken, both at commercial level and in households.

It was observed that the factors - marination time, baking temperature and time largely affect the quality of *tandoori* chicken. Response surface methodology technique has been used to optimise the process conditions for *tandoori* chicken. Data were collected on physical, chemical, microbiological and sensory profiles. The studies provided data for improvements in processing over the traditional method. Optimised process can enhance the quality from the point of microbial safety and sensory profile, result in energy saving, provide convenience and improve the marketability of the product.

PRODUCTION OF FRESH GINGER CANDY

S.R. SAMPATHU, N. KRISHNAMURTHY and H.B. SOWBHAGYA

Plantation Products, Flavours and Spice Technology Department
Central Food Technological Research Institute
Mysore-570 013, India

India is a major producer of ginger (*Zingiber officinale* Rosc) and average production is 1,65,000 tonnes per year. Kerala, Meghalaya, Orissa and West Bengal are the major states which produce ginger. Indian export of ginger in preserve form is very little and there is a good export potential for fresh ginger products to UK, USA and Canada. The present study was aimed at developing protocols and technology for producing such products.

Ginger *murabba* or preserve is a trditionally prepared item, valued for its appetising and medicinal properties. The traditional method of processing ginger involves manual operations like cleaning, peeling, syruping and others, which are not carried out strictly under hygienic conditions. This results in defects, like fermented smell, darkened colour and occasional mould growth.

Processing conditions have been optimised for making ginger preserve/candy, free of the above defects, so as to meet the international requirements. Variety, maturity, pre-treatments such as softening of the rhizome by cooking, syruping schedule and surface coating of the preserve are crucial steps which decide the quality of the finished product. The above operations have been optimised to assure a product of uniformly high quality. Material balance for a 1000 kg batch of fresh ginger has been obtained.

INDIAN TRADITIONAL SWEETMEATS - A CASE STUDY

S. YELLA REDDY, T. JEYARANI and J.V. PRABHAKAR

Lipid Science and Traditional Foods Department
Central Food Technological Research Institute
Mysore-570 013, India

India produces a variety of traditional sweets, each having unique texture and sensory attributes of its own. Though, traditional sweets is a major business consuming a nearly a quarter of sugar produced in the country, the industry operates on a cottage scale. The main reason for this is the difficulty faced by the industry to achieve uniform sensory profile of products on large scale. Besides, there are problems of equipment, packing and storage. Awareness of the process, clear understanding of the unit operations and precise information on functional properties of ingredients as well as process parameters bearing on quality of the end product are the missing links towards scale-up.

Two case studies, namely of *Bombay halwa* and *Mysorepak*, are examined to show how technological information, viz., functional properties of each ingredient and process parameters, facilitates large scale processing of each traditional foods of precise quality. Process for *Bombay halwa* has been simplified and the factors affecting the texture identified. Similarly, the components influencing fat absorption in *Mysorepak* have been identified. By managing the process parameters, it was observed that batches of *Mysorepak* having uniform fat content and texture could be prepared. Data of much value in translating cottage scale production of these sweets into an industrial scale, have been generated.

INSECT PEST AND INFESTATION IN TRADITIONAL FOODS MANUFACTURE AND STORAGE - A CASE STUDY

S. RAJENDRAN and K.S. NARASIMHAN

Food Protectants and Infestation Control Department
Central Food Technological Research Institute,
Mysore - 570 013, India

Papad is a popular traditional food consumed by rural and urban populations alike in India. Currently many industrial units with varied poduction capacities are involved in the production of *papads* for domestic and export markets.

Insect pest infestation resulting in quality deterioration and subsequent consumer rejection is a serious problem with most traditional foods and is of concern to the *papad* industry as well.

In this paper, case studies of the problems which were referred to CFTRI are examined. The importance of monitoring surveillance of insect pests in the factory premises, routing sanitation measures required and apporpriate control methods to be adopted to protect the raw material and finished products are discussed.

Factors such as (a) type of ingredients used in *papad* production, (b) processing mehods and (c) type of packaging materials which contribute to the quality maintenance of papads are discussed.

HUMAN RESOURCE DEVELOPMENT AT CFTRI IN THE CONTEXT OF TRADITIONAL FOODS

S. GODAVARI BAI

Human Resource Development Department
Central Food Technological Research Institute
Mysore-570 013, India

Scientific principles underlying the practices involved in the preparation of traditional foods need to be understood for their manufacture on an industrial scale. Professionally trained food technologist can play a vital role here. A trained food technologist can use his knowledge of food science and technology to assess and optimise quality and suitability of raw materials, lay protocols for Good Manufacturing Practices; develop packages for longer shelf-life, apply food engineering to develop machineries for unit operations and help in total optimization of traditional food manufacturing practices.

Human Resource Development in food science and technology has been an important activity of CFTRI and could play significant role in traditional foods integration into the food processing industry. In addition to a large number of Indians, the participants from countries of South East Asia, Africa, Latin America and Far East have undergone training in food science and technology during the past 3 decades.

Human Resource Development at CFTRI is primarily geared to meet the manpower needs of the food industry at various levels, such as top level management, research and development, quality control, production supervision and food plant operation. The training programmes conducted include Master of Science in Food Technology, Certificate course in Flour Milling Technology, Short term courses of 1-3 weeks in specific areas of food processing.

About 700 students from different countries have secured M.Sc., Degree Food Technology who are now occupying senior positions in industry, R&D Institution and Governments. About 25 courses in various areas of food processing are conducted every year with participation of about 400 personnel every year. Many of the participants who have attended the short term courses represent industries dealing with traditional foods.

MICROBIOLOGICAL QUALITY OF TRADITIONAL SWEETMEATS OF INDIA

J.S. SANDHU and M.N. KRISHNAMURTHY
Food Safety and Analytical Quality Control Laboratory
Central Food Technological Research Institute,
Mysore - 570 013, India

Traditional sweetmeats are usually prepared with, cereals or flours of legumes and sugar as raw materials. Fat is present either in the raw materials or as a result of frying. Sugar is added in powdered or syrup form. Fat content of the sweetmeats vary from 5 to 20 percent and sugar content from 10 to 60 percent. The water activity of these sweets vary between 0.6 to 0.98. Processing techniques and water activity in conjunction with pH influence the extent and nature of microflora in the sweet meats.

Simple scale - up operations result in consequences like spoilage due to microbial growth during processing and storage. Problems of rancidity, encrustation, fat bloom during storage at ambient temperatures and sandiness as well as mould growth during refrigerated storage have also been encountered.

Application of hazard analysis and critical central point (HACCP) concept to the processing of a traditional sweetmeat like *Laddu* helped to improve its quality and extend shelf-life from five to ten days.

COMMERCIALISATION OF TRADITIONAL FOODS - THE INDIAN EXPERIENCE WITH SPECIAL REFERENCE TO DAIRY FOODS.

VIJAY SOOD

Domino's Pizza India Ltd
New Delhi - 110 065, India

All modern foods of today were traditional foods at some point in history. Modernisation is a continuous process and even the modern foods of today may be classified as traditional foods at some point in future. Traditional or Modern foods is thus a very topical and subjective classification.

Before proceeding further, it is necessary to clearly understand the meaning of " Traditional Food ". There are two aspects of the word "Traditional":

1. Traditional in sensory quality as evolved historically.
2. Traditional in methods of preparation in the house/shop.

The matrix of driving forces responsible for modernisation of traditional foods and approaches used by food scientists and technologists to translate the driving forces for modernisation of traditional foods is presented.

For the sake of clarity, we may consider any food to be modern if it is centrally manufactured but marketed in multi-outlet/ multi-location environment as opposed to single point of manufacture and sale being typical of traditional foods. A food scientist or technologist can always take up a project on modernisaion of traditional foods as a purely scientific challenge. And chances are, given the necessary resources and challenge, he will succeed. But equal chances are that it may not see the market if it does not result in the right cost benefit advantage to make it a commercial success. Many research successes in the past have possibly remained confined to labs due to this factor.

For being successful it is, therefore, essential that cost benefit analysis and commercial viability of any modernisation effort should form an integral part of project formulation and review. As a result of project review, new / modified products may emerge, which though different from traditional foods, have the potential of becoming commercial successes. Infact, most modern foods of today would strictly fall in this category.

Modernisation may force changes in sensory quality of traditional foods due to the need to assimilate technical and commercial inputs. Such foods can be successfully marketed through proper pricing, promotion and advertising. The driving forces for modernisation are discussed in the context of the Indian experience.

Session VI
March 8, 1997

INDUSTRY INTERACTIONS

Saturday the 8th March 1997

SESSION VI: **INDUSTRY INTERACTIONS**

2. 00 PM
to
3.00 PM

Venue: Assembly Hall
Main Mansion

Chairperson : B.N. Som
Co-Chairperson : S.P. Pillai
Rapporteur : T.R. Prabhu

- ***Industry Representatives***
- ***Delegates from Academia***
- ***Representatives from MFPI & UNU***

3.00 PM **Tea**

Session VII
March 8, 1997

PLENARY SESSION

&

OPEN HOUSE DISCUSSION

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SESSION VII: **PLENARY SESSION**

Venue: Assembly Hall
Main Mansion

Chairperson : Promilla Issar
Joint Secretary
Ministry of Food Processing Industries,
New Delhi

3.15 PM to 5.00 PM — ***Panel Discussion and Recommendations on the Deliberations of the Earlier Sessions by Respective Chairpersons and Open House Discussion***

5.00 PM — **Closing Remarks**

Abraham Besrat

UNU, Tokyo

544
29 AUG 1997

5.30 PM — **High Tea**

Curtains - down

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